XMC-E540

Dual-port 10GBASE-T Ethernet XMC module
with Intel® Ethernet Controller X540

User's Manual

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Revision History

Revision	Release Date	Description of Change(s)
2.00	2013/08/07	Initial release

Preface

Disclaimer

The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

Environmental Responsibility

ADLINK is committed to fulfill its social responsibility to global environmental preservation through compliance with the European Union's Restriction of Hazardous Substances (RoHS) directive and Waste Electrical and Electronic Equipment (WEEE) directive. Environmental protection is a top priority for ADLINK. We have enforced measures to ensure that our products, manufacturing processes, components, and raw materials have as little impact on the environment as possible. When products are at their end of life, our customers are encouraged to dispose of them in accordance with the product disposal and/or recovery programs prescribed by their nation or company.

Trademarks

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

Using this Manual

Audience and Scope

The XMC-E540 User's Manual is intended for hardware technicians and systems operators with knowledge of installing, configuring and operating industrial grade computer systems.

Manual Organization

This manual is organized as follows:

Chapter 1, Introduction: Introduces the XMC-E540, its features, block diagrams, and package contents.

Chapter 2, Specifications: Presents detailed specification information.

Chapter 3, Board Interfaces: Describes the XMC-E540 connectors and switches.

Chapter 4, Getting Started: Describes the installation of the XMC-E540 to the carrier and driver installation.

Important Safety Instructions: Presents safety instructions all users must follow for the proper setup, installation and usage of equipment and/or software.

Getting Service: Contact information for ADLINK's worldwide offices.

Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.

Additional information, aids, and tips that help users perform tasks.

Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.

Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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1 Introduction

1.1 Overview

The XMC-E540 is a dual-port 10GBASE-T Ethernet XMC module with equipped with an Inte® Ethernet Controller X540. Featured are dual RJ-45 copper ports supporting 10G/1000/100BASE-T with auto-negotiation, jumbo frames up to 15.5KB, TCP/UDP segmentation, IPv6 IP/TCP, IP/UDP receive checksum offload, FCoE Tx/Rx CRC offload, and 256KB FCoE transmit segmentation. The XMC-E540 is compliant with the VITA 42.3-2006 XMC PCI Express Protocol Layer Standard.

1.2 Features

- Compliant with VITA 42.3 XMC standard with XMC.3 connector
- Dual-port Intel® 10Gigabit Ethernet Controller X540-AT2
- 10G/1G/100Mbps copper PHYs integrated on-chip
- Jumbo frames up to 15.5KB
- TCP/UDP segmentation, IPv6 IP/TCP, IP/UDP receive checksum offload
- FCoE Tx/Rx CRC offload, 256KB FCoE transmit segmentation
- Compliant with PCI Express Base Specification Rev. 2.1 (5GT/s)
- Compatible with PCIe x1, x2, x4, x8 lanes
- Dual RJ-45 copper ports
- Backward compatible with 1000BASE-T by auto-negotiation
- Preboot Execution Environment (PXE) support

1.3 Block Diagram

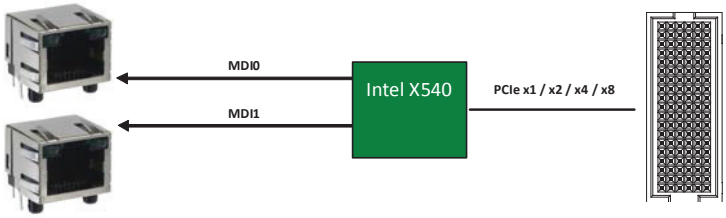

Figure 1-1: XMC-E540 Functional Block Diagram

1.4 Package Contents

The XMC-E540 is packaged with the following components. If any of the items on the contents list are missing or damaged, retain the shipping carton and packing material and contact the dealer for inspection. Please obtain authorization before returning any product to ADLINK. The packing contents of the XMC-E540 are non-standard configurations and may vary depending on customer requests.

- XMC-E540 module
- ADLINK All-in-One DVD
- User's manual

This product must be protected from static discharge and physical shock. Never remove any of the components except at a static-free workstation. Use the anti-static bag shipped with the product when putting the board on a surface. Wear an anti-static wrist strap properly grounded on one of the system's ESD ground jacks when installing or servicing system components.

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2 Specifications

2.1 XMC-E540 Module

Standards	VITA 42.3-2006 XMC PCI Express Protocol Layer Standard
Form Factor	• IEEE P1386, Standard XMC.3 • 74 mm x 149 mm x 8.2 mm (single width)
Controller	Intel® Ethernet Controller X540-AT2 • Dual port 100Mb/1000Mb/10Gb data rate • Intel® Virtualization Technology for Connectivity (VMDq, SR-IOV) • Fiber Channel over Ethernet • MACsec IEEE 802.1 AE • IEEE 1588 • Intel® Data Direct I/O Technology • Intelligent Offloads • Storage Over Ethernet (iSCSI, FCoE, NFS)
Interface	• PCI Express base specification 2.1 (2.5GT/s or 5GT/s) • Supports PCI Express x1, x4, x8 lanes • 64-bit address support for systems using more than 4 GB of physical memory
I/O	• Two RJ-45 10G/1000/100BASE-T ports • Auto-negotiation of 10 Gb/s, 1 Gb/s, 100Mb/s mode
OS Compatibility	• Microsoft Windows 7 64-bit • Microsoft® Windows® Server 2003 R2 (32-bit x86) • Microsoft® Windows® Server 2008 64-bit • Red Hat Enterprise Linux 6 x86 • Other OS support upon request
Environmental	• Operating Temperature: 0°C to 60°C (with forced air flow) • Storage Temperature: -40°C to 85°C • Humidity: 95%@60°C non-condensing • Vibration: Operating 2Grms, 5-500Hz
EMI	• CE EN55022 • FCC Class A


NOTE:

Specifications are subject to change without prior notice.

2.2 Intel® Ethernet Controller X540-AT2

The following section describes the features and functions of Intel® Ethernet Controller X540-AT2

- 10 GbE/1 GbE/100 Mb/s copper PHYs integrated on-chip
- Support for jumbo frames of up to 15.5 KB
- Flow control support: send/receive pause frames and receive
- FIFO thresholds
- Statistics for management and RMON
- 802.1q VLAN support
- TCP segmentation offload: up to 256 KB
- IPv6 support for IP/TCP and IP/UDP receive checksum offload
- Fragmented UDP checksum offload for packet reassembly
- Message Signaled Interrupts (MSI)
- Message Signaled Interrupts (MSI-X)
- Interrupt throttling control to limit maximum interrupt rate and improve CPU usage
- Flow Director (16 x 8 and 32 x 4)
- 128 transmit queues
- Receive packet split header
- Receive header replication
- Dynamic interrupt moderation
- DCA support
- TCP timer interrupts
- No snoop
- Relaxed ordering
- Support for 64 virtual machines per port (64 VMs x 2 queues)
- Support for Data Center Bridging (DCB);(802.1Qaz,
- 802.1Qbb, 802.1p)
- PCIe base specification 2.1 (2.5GT/s or 5GT/s)
- Bus width - x1, x2, x4, x8

2.3 Power Consumption

The power consumption data of the XMC-E540 was measured installed in an ADLINK cPCI-6510 carrier blade using a Spirent SmartBits network performance analysis system.

Power Consumption		
Engine Clock	**Current @ 5V**	**Power (W)**
Idle Load	0.44 A	2.2 W
Max. Load	1.50 A	7.5 W

Table 2-1: XMC-E540 Power Consumption

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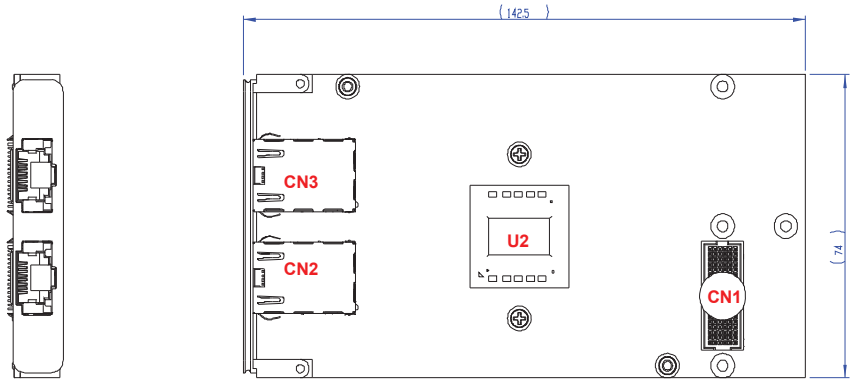
3 Board Interfaces

This chapter illustrates the board layout, connector pin assignments, and switch settings to familiarize users with the XMC-E540.

3.1 XMC-E540 Board Layout



U2	Intel X540
CN1	XMC connector
CN2/3	RJ-45 10GbE connectors

Figure 3-1: XMC-E540 Board Layout

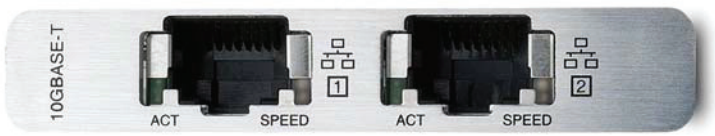


Figure 3-2: XMC-E540 Front Panel

3.2 Connector Pin Assignments

RJ-45 10G Ethernet Connectors (CN2/3)

Pin #	100BASE-TX	10G/1000BASE-T
1	TX+	LAN_TX0+
2	TX-	LAN_TX0-
3	RX+	LAN_TX1+
4	--	LAN_TX2+
5	--	LAN_TX2-
6	RX-	LAN_TX1-
7	--	LAN_TX3+
8	--	LAN_TX3+

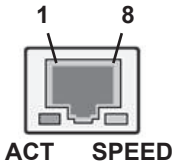
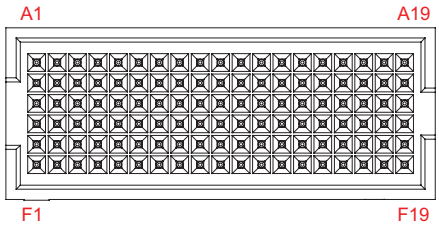


Table 3-1: RJ-45 10GbE Connector Pin Definitions

Status		ACT	SPEED
Network link is not established or system powered off		Off	Off
100 Mbps (100BASE-T)	Link	On (Green)	Off
	Active	Blinking	
1000 Mbps (1000BASE-TX)	Link	On (Green)	Yellow
	Active	Blinking	
10 Gbps (10GBASE-T)	Link	On (Green)	Blue
	Active	Blinking	

XMC Connector (CN1)



Pin#	A	B	C	D	E	F
1	PET0p0	PET0n0	3.3V	PET0p1	PET0n1	VPWR
2	GND	GND	Reserved	GND	GND	MRSTI#
3	PET0p2	PET0n2	3.3V	PET0p3	PET0n3	VPWR
4	GND	GND	Reserved	GND	GND	Reserved
5	PET0p4	PET0n4	3.3V	PET0p5	PET0n5	VPWR
6	GND	GND	Reserved	GND	GND	NC
7	PET0p6	PET0n6	3.3V	PET0p7	PET0n7	VPWR
8	GND	GND	NC	GND	GND	NC
9	NC	NC	NC	NC	NC	VPWR
10	GND	GND	NC	GND	GND	Reserved
11	PER0p0	PER0n0	Reserved	PER0p1	PER0n1	VPWR
12	GND	GND	Reserved	GND	GND	MPRESENT#
13	PER0p2	PER0n2	Reserved	PER0p3	PER0n3	VPWR
14	GND	GND	Reserved	GND	GND	Reserved
15	PER0p4	PER0n4	N.C.	PER0p5	PER0n5	VPWR
16	GND	GND	Reserved	GND	GND	Reserved
17	PER0p6	PER0n6	N.C.	PER0p7	PER0n7	N.C.
18	GND	GND	N.C.	GND	GND	N.C.
19	REFCLK+0	REFCLK-0	N.C.	N.C.	N.C.	N.C.

Table 3-2: XMC Connector Pin Definition

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4 Getting Started

4.1 Installing the Module

1. Remove the XMC slot filler faceplate from the front panel of the host board.
2. Insert the faceplate of the XMC module into the XMC slot in the front panel of the host board.
3. Carefully align the male connectors of the XMC module (component-side down) to the female connectors of the host board and firmly press down.
4. Secure the XMC module with the four screws provided from the bottom side of the host board.

4.2 Driver Installation

The XMC-E540 drivers can be found on the ADLINK All-In-One DVD at **X:\XMC\XMC-E540\LAN**, or at the ADLINK website (**http://www.adlinktech.com**). Driver installation procedures for Windows 7 are described below.

1. Install the Windows operating system before installing any driver. Most standard I/O device drivers are installed during Windows installation.
2. Install the LAN drivers by extracting and running the executable file in **...\LAN\Intel_Network_Adapter_AllOS_v16.6.zip**

We recommend using the drivers provided on the ADLINK All-in-One DVD or downloaded from the ADLINK website to ensure compatibility.

Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment:
  - Turn off power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources;
  - Keep equipment away from high heat or high humidity;
  - Keep equipment properly ventilated (do not block or cover ventilation openings);
  - Make sure to use recommended voltage and power source settings;
  - Always install and operate equipment near an easily accessible electrical socket-outlet;
  - Secure the power cord (do not place any object on/over the power cord);
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

A Lithium-type battery may be provided for uninterrupted, backup or emergency power.

Risk of explosion if battery is replaced with one of an incorrect type. Dispose of used batteries appropriately.

- Equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.

Getting Service

Contact us should you require any service or assistance.

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